

U.S. Patent Application Serial No. **10/622,513**
Amendment filed June 27, 2007
Reply to OA dated December 27, 2006

REMARKS

This Amendment is filed concurrently with a Request for Continued Examination. Claims 12 and 15 are pending in this application. Claims 12 and 15 are amended herein. Upon entry of this amendment, claims 12 and 15 will be pending.

The applicant respectfully submits that no new matter has been added. Support for the amendments to the claims is detailed below. It is believed that this Amendment is fully responsive to the Office Action dated **December 27, 2006**.

Claims 12 and 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. (Office action paragraph no. 4)

The rejection is overcome by the amendment to claims 12, in which “in a pellet-like shape” has been amended to “into pellets.” Support for the recitation that “the masterbatch has been molded into pellets” may be found on page 17, lines 10-21, of the specification.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (US 2002/0086926) in view of Hawley’s (*Hawley’s Condensed Chemical Dictionary, 13th Edition*), Ali (US 6,194,507), and Takeda et al. (US 6,319,613). (Office action paragraph no. 5)

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (US 2002/0086926) in view of Hawley’s (*Hawley’s Condensed Chemical Dictionary, 13th Edition*), Ali

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(US 6,194,507), and Takeda et al. (US 6,319,613) and further in view of Wypych (*Handbook of Fillers*). (Office action paragraph no. 6)

Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fisher (US 2002/0086926) in view of Hawley's (*Hawley's Condensed Chemical Dictionary, 13th Edition*), Ali, Takeda et al. (US 6,319,613) and further in view of and Hall (EP 0 459 704). (Office action paragraph no. 7)

Reconsideration of the rejections is respectfully requested in view of the amendments to the claims, the following arguments, and the documents in the attached IDS. Claim 12 has been amended to incorporate the limitation that "the thermoplastic resin is one selected from the group consisting of polycarbonate resin and polyether-imide resin." Support for this limitation may be found in claim 15, which had recited three possible thermoplastic resins. The limitation on the chemical nature of the thermoplastic resin has been deleted in claim 15.

Regarding the Glass transition temperatures (Tg) of the polyvinyl butyral composition

(1) The Examiner states (page 7 of the Office action) that it is not made clear from where the Tg range of 3-30°C is derived.

Applicant therefore here provides reference data supporting the argument that the glass transition temperatures (Tg) of the polyvinyl butyral composition are adjusted at about 3°C for automotive glass sheets and at about 30°C for structural glass sheets.

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(2) The document labeled Exhibit 1 (see partial English translation thereof) relates to interlayer films formed from polyvinyl butyral and was obtained by downloading from the Internet site of Sekisui Chemical Co., Ltd.

This document describes interlayer films of polyvinyl butyral (brand name: S-LEC Film), and it discloses that the glass transition temperature of "S-LEC Film" for architectural use is 30°C (provided, however, that this measurement method is carried out by the use of a differential scanning calorimeter) and that the glass transition temperature of "S-LEC Film" for automotive use is 3°C (provided that this measurement method is also carried out by the use of a differential scanning calorimeter). This supports Applicant's argument of the previous Response.

(3) Furthermore, attention is paid to Fisher (US 2002/0086926) on polyvinyl butyral. The document labeled Exhibit 2 (Mistler et al., "Evaluation of an Environmentally Friendly Plasticizer for Polyvinyl Butyral For Use in Tape Casting") was published by "Solutia Inc.," which can be seen in WO 02/060988 to be the applicant company for W. Keith Fisher.

This document discloses polyvinyl butyral formulations in which a plasticizer [triethylene glycol bis(2-ethylhexanoate): brand name S-2075] has been utilized. And this plasticizer has been used in the Examples of Fisher (US 2002/ 0086926). On page 2 of Mistler et al., the lower left-hand graph shows the relationship between the contents of "S-2075" and the glass transition temperatures of polyvinyl butyral. Meanwhile, the lower right-hand graph shows the relationship between the contents of a conventional plasticizer [butyl benzyl phthalate (BBP): brand name S-160] and the glass transition temperatures of polyvinyl butyral.

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In accordance with the contents of triethylene glycol bis(2-ethylhexanoate) used in Examples 1, 6 and 7 of Fisher (US 2002/ 0086926), the glass transition temperatures of polyvinyl butyral are derived from the above-noted left-hand graph. As a result, it can be found that each such glass transition temperature is in the vicinity of about 30°C. The glass transition temperature thus derived is generally equal to the numerical value of glass transition temperature disclosed in the documentary material (Exhibit 1) of Sekisui Chemical Co., Ltd.

More specifically, the proportions in terms of “weight of a plasticizer/total weight of a polyvinyl butyral composition” are indicated as follows:

Example 1: $19/(19 + 0.32 + 50) = \text{about } 27\%$;

Example 6: $(5.11 + 878.7)/(5.11 + 878.7 + 2250) = \text{about } 28\%$; and

Example 7: $(5.11 + 21.47 + 863.7)/(5.11 + 21.47 + 863.7 + 2250) = \text{about } 28\%$.

And the glass transition temperatures of polyvinyl butyral, when derived from the above-cited left-hand graph, are found to be in the vicinity of about 30°C, respectively.

Comparisons between polypropylene and polyethylene, each of which has a lower Tg than room temperature, and polyvinyl butyral having a Tg in the vicinity of about 30°C

(1) The Examiner also states that, on the ground that polypropylene and polyethylene each having a lower Tg than room temperature are commonly in pellet form, polyvinyl butyral having a higher Tg than polypropylene and the like is not necessarily nonsolid.

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Applicant respectfully disagrees and presents the following evidence.

(2) Exhibit 3 is obtained from the Internet site entitled "Homepage of Mechanical Engineering." A table (Exhibit 3) of "Noncrystalline Resins and Crystalline Resins" concerning thermoplastic resin materials is placed in a "Nonferrous Materials" section of mechanical materials. Upon review of this table, it can be confirmed that polyvinyl butyral and polycarbonate resin are classified into a group of noncrystalline resins, whereas polypropylene and polyethylene are classified into a group of crystalline resins.

Exhibit 4 is obtained from the Internet site of Asahi Kasei Chemicals Corporation. Similarly, upon review of the table of "Classification of Plastics" in this document, it can also be confirmed that polypropylene and polyethylene are classified into the group of crystalline resins (marked with ○), and polycarbonate resin and polyether-imide resin are classified into the group of noncrystalline resins (marked with Δ).

(3) Exhibit 5 was obtained from the Internet site of Koito Jushi Co., Ltd. In this document, in the table entitled "Differences between Noncrystalline Plastics and Crystalline Plastics," a crystalline plastic is defined as "meaning a high polymer having a crystalline region at a high quantitative proportion (i.e., having a high degree of crystallinity), the crystalline region being meant by the state in which molecular chains have been arranged with regularity, and a noncrystalline plastic is defined as "meaning a high polymer which has an extremely low crystallinity, or hardly becomes crystallized".

(4) Exhibit 6 was obtained from the Internet site of Asahi Kasei Chemicals Corporation. How the state of a thermoplastic (resin) is variable with temperature changes is shown in "Figure 3-2: Relationship between Temperatures and Elastic Moduli" of this document. Moreover, at the page on which Figure 3-2 appears, it is stated that: "Temperature Dependency: The temperature dependency of a thermoplastic on elastic modulus varies suddenly with a boundary set at the glass transition temperature (T_g). The temperature dependency varies relatively slowly at a lower temperature than T_g , but it varies rapidly at a higher temperature than T_g . This behavior may be considered to be one arising from the viscosity of a polymer, that is, the temperature dependency of the polymer with respect to the ease of slipping between the polymer molecular chains."

(5) That is, noncrystalline resins such as polyvinyl butyral, polycarbonate resin, polyether-imide resin, etc., have no regularity in the arrangement of plastic molecular chains. Thus, such a noncrystalline resin when exposed to heat comes to soften gradually since the state of entanglement between the molecular chains loosens gradually. When the temperature further rises, this resin becomes liquid in nature. And because it is difficult to precisely determine the melting point in the noncrystalline resin, the softening temperature (glass transition point, T_g) is usually used as a thermal parameter for determining whether or not the resin becomes nonsolid. As shown in Figure 3-2 cited above, the elastic modulus drops suddenly at a temperature exceeding T_g . In other words, whether or not polyvinyl butyral within the category of noncrystalline plastics becomes nonsolid must be determined by its glass transition point, T_g , but not by its melting point.

(6) In contrast, crystalline resins such as polypropylene, polyethylene, etc., have a lot of crystalline regions in which the molecular chains have been arranged with regularity. Such a crystalline resin, when subjected to heat energy, relatively maintains strength until it reaches the melting point since the rigidity decreases slowly toward the melting point (see a curved line labeled as “crystalline” in Figure 3-2). More specifically, the crystalline resins such as polypropylene, polyethylene, etc., relatively have rigidity even at a higher temperature than T_g until they reach the melting points, as shown in Figure 3-2. While the Examiner states that polypropylene and polyethylene each having a lower T_g than room temperature are commonly in pellet form, this statement only points to the phenomenon just mentioned. In other words, whether or not polypropylene and polyethylene within the category of crystalline plastics become nonsolid must be determined by their melting points, but not by their glass transition points, T_g.

Therefore, the Examiner is incorrect in stating that, on the ground that polypropylene and polyethylene each having a lower T_g than room temperature are commonly in pellet form, polyvinyl butyral having a higher T_g than polypropylene and the like is not necessarily nonsolid.

Regarding Molding of polyvinyl butyral into pellets

As noted above, claim 12 has been amended to limit the thermoplastic resin to polycarbonate resin or polyether-imide resin. Polycarbonate resin and polyether-imide resin are noncrystalline plastics (see Exhibits 3 and 4).

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Exhibit 7 is from "Introduction to Plastic Properties," page 172, Table 4-3, published by Nikkan Kogyo Shimbun Co., Ltd. Exhibit 8 is Chemical Handbook: Applied Chemistry, 5th Edition, Table II-45, Published by Maruzen Co., Ltd. The Tg of polyvinyl butyral, which is also a noncrystalline plastic, is in the vicinity of about 30°C, whereas the Tg of polycarbonate resin noted above is 150°C (see Exhibit 7), and the Tg of polyether-imide resin noted above is 217°C (see Exhibit 8). Each of polycarbonate resin and polyether-imide resin (recited in amended claim 12) has a markedly high glass transition temperature (Tg) when compared to that of polyvinyl butyral used in the Fisher reference.

As previously discussed, whether or not the noncrystalline plastics become nonsolid is determined by the glass transition points, Tg. Polycarbonate resin and polyether-imide resin, which fall within the noncrystalline plastics and have a Tg range of 150-217°C, can be molded into pellets at room temperature. However, polyvinyl butyral having a Tg of approximately 30°C cannot be molded into pellets at a temperature exceeding the vicinity of 30°C.

Therefore, **molding of Fisher's polyvinyl butyral composition into pellets is technically impossible**. The modification of the references proposed by the Examiner is therefore impossible, and would not work for Fisher's stated purpose. Accordingly, the references cannot be combined as suggested, and there is no *prima facie* case of obviousness.

Regarding the Examiner's position that the Fisher reference suggests the use of thermoplastic resins other than polyvinyl butyral

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The Examiner implies that the Fisher reference suggests the use of thermoplastic resins other than polyvinyl butyral (page 6 of the Office action). This statement is based on the description of Fisher's paragraph [0021], that is, "While PVB is the preferred resin used in the present invention, it should be recognized that other polymers which may be used to form interlayer sheets of glass laminates could be substituted for PVB."

However, paragraph [0021] merely indicates the possibility of utilizing other polymers which are used for interlayer sheets of glass laminates and also have similar properties to those of polyvinyl butyral. It does not specifically suggest the polycarbonate resin and polyether-imide resin set forth in amended claim 12.

Regarding a master batch containing a heat radiation shielding component according to the present invention

(1) The master batch containing a heat radiation shielding component according to the present invention is obtained by dispersing a hexaboride, which is a heat radiation shielding component, at a high concentration into a thermoplastic resin itself, and then by molding the thermoplastic resin, which has the heat radiation shielding component dispersed therein, into pellets. This master batch is solid at room temperature.

Thus, the presently claimed master batch can be clearly distinguished from Fisher's polyvinyl butyral composition, which is obtained firstly by dispersing a hexaboride in a plasticizer, and then

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by adding the plasticizer dispersion, which has the hexaboride dispersed therein, to a polyvinyl butyral resin. This polyvinyl butyral composition is nonsolid in nature at room temperature.

(2) Since the master batch containing a heat radiation shielding component according to the present invention is solid at room temperature, storage is possible for a long period of time. In using this master batch, free concentration control of the heat radiation shielding component is possible by being diluted and kneaded with a thermoplastic resin form material of the same type as the thermoplastic resin of the master batch, or a different type of thermoplastic resin form material which is compatible with the master batch. The master batch of the present invention is molded and hardened by molding means and provides a heat radiation shielding transparent resin form. Convenience of the master batch is significantly good.

Applicant therefore submits that claims 12 and 15, as amended, are not obvious over the cited references.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

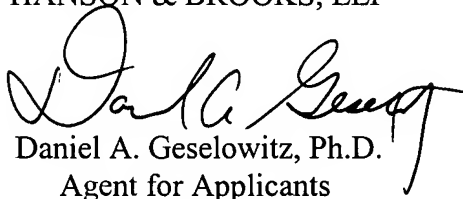
In the event that this paper is not timely filed, the Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other

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fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, KRATZ, QUINTOS,
HANSON & BROOKS, LLP


Daniel A. Geselowitz, Ph.D.
Agent for Applicants

Reg. No. 42,573

DAG/ejb
Atty. Docket No. **030812**
Suite 1000
1725 K Street, N.W.
Washington, D.C. 20006
(202) 659-2930



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